

(3) The condition of a completely depleted battery with the generator operating at idling speed, if there is only one battery.

(d) There must be means to warn appropriate crewmembers if malfunctioning of any part of the electrical system is causing the continuous discharge of any battery used for engine ignition.

(e) Each turbine engine ignition system must be independent of any electrical circuit that is not used for assisting, controlling, or analyzing the operation of that system.

(f) In addition, for commuter category airplanes, each turbopropeller ignition system must be an essential electrical load.

[Doc. No. 4080, 29 FR 17955, Dec. 18, 1964, as amended by Amdt. 23-17, 41 FR 55465 Dec. 20, 1976; Amdt. 23-34, 52 FR 1833, Jan. 15, 1987]

POWERPLANT FIRE PROTECTION

§ 23.1181 Designated fire zones; regions included.

Designated fire zones are—

(a) For reciprocating engines—

(1) The power section;

(2) The accessory section;

(3) Any complete powerplant compartment in which there is no isolation between the power section and the accessory section.

(b) For turbine engines—

(1) The compressor and accessory sections;

(2) The combustor, turbine and tailpipe sections that contain lines or components carrying flammable fluids or gases.

(3) Any complete powerplant compartment in which there is no isolation between compressor, accessory, combustor, turbine, and tailpipe sections.

(c) Any auxiliary power unit compartment; and

(d) Any fuel-burning heater, and other combustion equipment installation described in § 23.859.

[Doc. No. 26344, 58 FR 18975, Apr. 9, 1993, as amended by Amdt. 23-51, 61 FR 5138, Feb. 9, 1996]

§ 23.1182 Nacelle areas behind firewalls.

Components, lines, and fittings, except those subject to the provisions of

§ 23.1351(e), located behind the engine-compartment firewall must be constructed of such materials and located at such distances from the firewall that they will not suffer damage sufficient to endanger the airplane if a portion of the engine side of the firewall is subjected to a flame temperature of not less than 2000 °F for 15 minutes.

[Amdt. 23-14, 38 FR 31816, Nov. 19, 1973]

§ 23.1183 Lines, fittings, and components.

(a) Except as provided in paragraph (b) of this section, each component, line, and fitting carrying flammable fluids, gas, or air in any area subject to engine fire conditions must be at least fire resistant, except that flammable fluid tanks and supports which are part of and attached to the engine must be fireproof or be enclosed by a fireproof shield unless damage by fire to any non-fireproof part will not cause leakage or spillage of flammable fluid. Components must be shielded or located so as to safeguard against the ignition of leaking flammable fluid. Flexible hose assemblies (hose and end fittings) must be shown to be suitable for the particular application. An integral oil sump of less than 25-quart capacity on a reciprocating engine need not be fireproof nor be enclosed by a fireproof shield.

(b) Paragraph (a) of this section does not apply to—

(1) Lines, fittings, and components which are already approved as part of a type certificated engine; and

(2) Vent and drain lines, and their fittings, whose failure will not result in, or add to, a fire hazard.

[Doc. No. 4080, 29 FR 17955, Dec. 18, 1964, as amended by Amdt. 23-5, 32 FR 6912, May 5, 1967; Amdt. 23-15, 39 FR 35460, Oct. 1, 1974; Amdt. 23-29, 49 FR 6847, Feb. 23, 1984; Amdt. 23-51, 61 FR 5138, Feb. 9, 1996]

§ 23.1189 Shutoff means.

(a) For each multiengine airplane the following apply:

(1) Each engine installation must have means to shut off or otherwise prevent hazardous quantities of fuel, oil, deicing fluid, and other flammable liquids from flowing into, within, or

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through any engine compartment, except in lines, fittings, and components forming an integral part of an engine.

(2) The closing of the fuel shutoff valve for any engine may not make any fuel unavailable to the remaining engines that would be available to those engines with that valve open.

(3) Operation of any shutoff means may not interfere with the later emergency operation of other equipment such as propeller feathering devices.

(4) Each shutoff must be outside of the engine compartment unless an equal degree of safety is provided with the shutoff inside the compartment.

(5) Not more than one quart of flammable fluid may escape into the engine compartment after engine shutoff. For those installations where the flammable fluid that escapes after shutdown cannot be limited to one quart, it must be demonstrated that this greater amount can be safely contained or drained overboard.

(6) There must be means to guard against inadvertent operation of each shutoff means, and to make it possible for the crew to reopen the shutoff means in flight after it has been closed.

(b) Turbine engine installations need not have an engine oil system shutoff if—

(1) The oil tank is integral with, or mounted on, the engine; and

(2) All oil system components external to the engine are fireproof or located in areas not subject to engine fire conditions.

(c) Power operated valves must have means to indicate to the flight crew when the valve has reached the selected position and must be designed so that the valve will not move from the selected position under vibration conditions likely to exist at the valve location.

[Doc. No. 4080, 29 FR 17955, Dec. 18, 1964, as amended by Amdt. 23-7, 34 FR 13096, Aug. 13, 1969; Amdt. 23-14, 38 FR 31823, Nov. 19, 1973; Amdt. 23-29, 49 FR 6847, Feb. 23, 1984; Amdt. 23-43, 58 FR 18975, Apr. 9, 1993]

§ 23.1191 Firewalls.

(a) Each engine, auxiliary power unit, fuel burning heater, and other combustion equipment, must be isolated from the rest of the airplane by

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firewalls, shrouds, or equivalent means.

(b) Each firewall or shroud must be constructed so that no hazardous quantity of liquid, gas, or flame can pass from the compartment created by the firewall or shroud to other parts of the airplane.

(c) Each opening in the firewall or shroud must be sealed with close fitting, fireproof grommets, bushings, or firewall fittings.

(d) [Reserved]

(e) Each firewall and shroud must be fireproof and protected against corrosion.

(f) Compliance with the criteria for fireproof materials or components must be shown as follows:

(1) The flame to which the materials or components are subjected must be $2,000 \pm 150^\circ\text{F}$.

(2) Sheet materials approximately 10 inches square must be subjected to the flame from a suitable burner.

(3) The flame must be large enough to maintain the required test temperature over an area approximately five inches square.

(g) Firewall materials and fittings must resist flame penetration for at least 15 minutes.

(h) The following materials may be used in firewalls or shrouds without being tested as required by this section:

(1) Stainless steel sheet, 0.015 inch thick.

(2) Mild steel sheet (coated with aluminum or otherwise protected against corrosion) 0.018 inch thick.

(3) Terne plate, 0.018 inch thick.

(4) Monel metal, 0.018 inch thick.

(5) Steel or copper base alloy firewall fittings.

(6) Titanium sheet, 0.016 inch thick.

[Doc. No. 4080, 29 FR 17955, Dec. 18, 1964, as amended by Amdt. 23-43, 58 FR 18975, Apr. 9, 1993; 58 FR 27060, May 6, 1993; Amdt. 23-51, 61 FR 5138, Feb. 9, 1996]

§ 23.1192 Engine accessory compartment diaphragm.

For aircooled radial engines, the engine power section and all portions of the exhaust system must be isolated